



## TECHNICAL REPORT

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# Key Findings of the Ghana Situational Analysis of Inpatient Care of Sick Newborns and Young Infants

OCTOBER 2019

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This technical report was prepared by University Research Co., LLC (URC) for review by the United States Agency for International Development (USAID) and authored by Nancy Fronczak, Tamar Chitashvili, Ernest Opoku, and Sarah Kauder of URC and Isabella Sagoe-Moses of the Ghana Health Service. The USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project is made possible by the generous support of the American people through USAID.



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Nancy Fronczak, University Research Co., LLC  
Tamar Chitashvili, University Research Co., LLC  
Ernest Opoku, University Research Co., LLC  
Isabella Sagoe-Moses, Ghana Health Service  
Sarah Kauder, University Research Co. LLC

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## TABLE OF CONTENTS

I.	INTRODUCTION .....	1
A.	Objective .....	1
B.	Methods .....	1
II.	FINDINGS ON NYI POLICIES, MANAGEMENT PRACTICES, AND RESOURCES .....	2
A.	Support for expansion/improvement of NYI services.....	2
B.	Systems and practices for improving quality of care .....	4
C.	Systems and practices to support services availability.....	7
III.	FACILITY-LEVEL FINDINGS .....	8
A.	Infant care units .....	8
B.	Staffing qualification and numbers.....	9
C.	Facility level management practices .....	9
D.	Support for parent/caregiver .....	10
E.	Staff management practices .....	10
F.	Patient transfers.....	10
G.	Care coordination and communication .....	11
IV.	SERVICES AND RESOURCES FOR NEWBORNS AND YOUNG INFANTS.....	11
A.	Availability of inpatient services for NYIs .....	11
B.	Specific infant care services and resources for their provision.....	12
C.	Protocols, guidelines, job aids at NYI care points.....	13
V.	AVAILABILITY OF EQUIPMENT, DIAGNOSTICS, AND CONSUMABLE RESOURCES.....	13
A.	Monitoring, diagnostic, and treatment equipment.....	13
VI.	PHYSICAL ENVIRONMENT OF INFANT CARE UNIT.....	15
A.	Infection prevention and control (IPC) in the highest level NYI service area .....	15
B.	Observed infant safety practices.....	16
VII.	REVIEW OF INFANT MEDICAL RECORDS.....	16
A.	Recording of newborn assessment .....	16
B.	Recording for the sick infant .....	16
VIII.	PERSONAL EXPERIENCES AND OPINIONS .....	18
A.	Service providers and managers .....	18
B.	Mothers of current inpatient infants .....	18
IX.	DISCUSSION AND CONCLUSIONS .....	18
X.	RECOMMENDATIONS.....	20
A.	Planning for expansion/improvement of NYI services .....	20

B. Systems to support quality of NYI care.....	21
C. Readiness to provide services.....	21
D. Infection prevention and control and infant safety.....	22
E. Recording of infant care.....	22

## List of Tables and Figures

Figure 1: Percentage of facilities reporting indicator monitored at facility level (n=9 facilities).....	4
Figure 2: Percentage of medical and nursing/midwifery respondents reporting they received in-service training in the past 12 months on at least one topic within the indicated subject.....	5
Figure 3: Number of facilities reporting preventive maintenance for indicated equipment (n=9 facilities) ...	8
Figure 4: Percentage of facilities reporting the indicated management practices (n=9 facilities).....	9
Figure 5: Percentage of facilities reporting the indicated support for parents/caregivers of infants (n=9 facilities).....	10
Figure 6: Average percent of all services within each category that are reported available in the facilities assessed in each region.....	12
Figure 7: Percentage of facilities with each basic equipment item (n=9 facilities).....	13
Figure 8: Percentage of facilities with capacity to perform each test (n=9 facilities).....	14
Figure 9: Number of facilities with oxygen administration resources (n=8 facilities).....	14
Figure 10: Percentage of facilities with the indicated infant care equipment (n=9 facilities).....	15
Figure 11: Average facility percentage of items available for facilities in each region (n of facilities in the region).....	15
Figure 12: Average facility percentage of items documented for each type of assessment in the reviewed records, by regions.....	16
Figure 13: Facility average percentage of all items for each type of assessment that is documented in the reviewed records.....	17
Figure 14: Average facility percent of 10 routine monitoring items that are recorded.....	17
Table 1: Final sample numbers.....	2
Table 2: Availability of policy, planning, and service provision documents (strategies, protocols, guidelines).....	3
Table 3: Activities for monitoring and addressing quality of care.....	6
Table 4: Infant case reviews.....	7
Table 5: Types of infant care units in assessed facilities.....	8

## Acronyms

ASSIST	USAID Applying Science to Strengthen and Improve Systems Project
CHPS	Community Health Planning and Services
CPAP	Continuous positive airway pressure
CSF	Cerebral spinal fluid
DSW	Department of Social Welfare
EEG	Electro encephalograph machine
GHS	Ghana Health Service
HeFRA	Health Facilities Regulatory Agency
HMIS/HIS	Health Management Information System/Health Information System
HLD	High-level disinfection
IPC	Infection prevention and control
KMC	Kangaroo mother care
LBW	Low birth weight
MOH	Ministry of Health
NHIS	National Health Insurance Scheme
NYI	Newborn and young infants
NICU	Neonatal Intensive Care Unit
NMW	Nurse or midwife or nurse midwife (dual trained)
PI	Principal Investigator
QOC	Quality of care
TA	Technical assistance
TWG	Technical working group
URC	University Research Co., LLC
USAID	United States Agency for International Development
WACPS	West African College of Physicians and Surgeons





# I. INTRODUCTION

## A. Objective

The Situation Analysis for Inpatient Care of Newborns and Young Infants in Ghana is part of the USAID-led global initiative to understand the status of inpatient care of sick newborns and young infants (NYI) in low-and-middle-income countries. The study was conducted with the support of USAID maternal and child health (MCH) core-funding in 2018.

The objective of this assessment was to gather information on the status of inpatient services for NYI in Ghana. This information will be used to inform national planning as well as international strategies for improving NYI inpatient care.

## B. Methods

The USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project conducted an assessment in 9 selected regional and district hospitals across 3 regions in Ghana during May and June 2018. The 9 selected hospitals included 2 with Neonatal Intensive Care Units (NICUs) and one with a special or basic care unit in each region. Data collection tools were developed by experts in NYI services and adapted to the Ghana context. Key informant interviews were conducted with national and regional Ministry of Health (MOH) personnel as well as with facility-level managers or service providers and infant caregivers. On average, 2-3 doctors or nurses and 2 caregivers were interviewed in each facility. In addition, each facility was assessed for availability of resources, infant care systems and services. Data collection tools were adapted from generic tools developed by experts in NYI services. The tools were:

Tool 1: National profile collection form: Information on the existence and implementation of national policies and health system practices as well as existing recent data on national NYI indicators and basic NYI service infrastructure was collected.

Tool 2: National guidelines abstraction form: Documents with policies/protocols/guidelines were reviewed for content and inclusion of specific topics was collected. The quality of the content within a specific document was not assessed

Tool 3: Structured interview guide for national level persons: This covered policies, guidelines, and issues related to service provision and quality of care.

Tool 4: Structured interview guide for regional level persons: This covered similar topics to the national level interviews.

Tool 5: Structured facility assessment tool: Facility and unit infrastructure, resources to provide services (equipment, diagnostics, treatments), and items to support the quality of services (protocols and guidelines, and trained staff) were assessed.

Tool 6: Patient record review: Infant medical records/charts were reviewed for documentation of routine assessments of the newborn and initial assessment and routine monitoring of the sick infant. The actual quality of the information and the care provided were not assessed.

Tool 7: Facility-based health information reports review: Facility Health Management Information System (HMIS) reports and unit registers were reviewed and service and patient statistics collected.

Tool 8: Personal interview guide for facility level health care workers: Personal experience, practices, and opinions related to care of the sick infant, interactions with caregivers, and experience with staffing practices were assessed.

Tool 9: Personal interview guide for parent/caregiver of current patients: Personal experiences, opinions related to the care of their infant by the facility and their ability to care for the infant on discharge were assessed.

Key informant interviews using structured interview guides were conducted at national and regional Ministry of Health (MOH) offices to better understand policies, issues, and support for expansion and improvement of NYI services, and documents reviewed for evidence of subjects for where there were policies, protocols, and guidelines. Facilities were visited by a single team of nurse midwives (NMWs) and doctors. The team collected information on services available, equipment, infrastructure, staffing, elements to support quality services, and service site conditions in various units providing NYI services. Information was provided by the most knowledgeable person available in each service site and validated by observation where relevant. Medical records for infants who were current inpatients were reviewed for newborn assessment and sick infant monitoring content. In addition, key informant interviews for personal experiences and opinions related to facility conditions and NYI care were conducted with managers and services providers as well as parents/caregivers of inpatient infants using an opportunistic sample. Informed consents were obtained from respondents prior to personal interviews and from the facility in-charge prior to collecting information in the facility. Final sample numbers are provided in **Table 1**.

**Table 1: Final sample numbers, Key informant interviews**

Category (data source)	Region 1	Region 2	Region 3	Total
Facility				
Regional hospital	2	1	1	4
District hospital	1	2	2	5
Provider Key informants				
Medical staff (physicians)	2	3	0	5
Nursing/midwifery staff	5	3	4	12
Infant caregiver informants				
Mother of infant	7	6	6	19
Infant medical records reviewed				
Number of records	15	15	44	74

## II. FINDINGS ON NYI POLICIES, MANAGEMENT PRACTICES, AND RESOURCES

### A. Support for expansion/improvement of NYI services

**Planning and policies:** National and regional level respondents identified the support they receive for NYI inpatient care services as moderate, with lack of financial support for improving/expanding NYI services cited as a barrier to providing quality services. There is a strategic plan to expand NYI services, and informants noted that they are advocating that infrastructure for NYI care units be planned in all new facilities and pre-service training for specialists be developed. Specific plans with items, numbers, a timeline, and benchmarks to be monitored, however, were not identified.

**Coordination:** Functional coordination at national and regional levels with multi-disciplinary participation was described. Facility level management and coordination meetings that address NYI patients and services were also widespread. There is a Department of Social Welfare (DSW) that provides support for parents when needed for improved infant care. Inclusion of community representatives and liaising with community groups for NYI care and follow-up after discharge was not reported.

**Documents to support service expansion and quality:** Policies, protocols, and guidelines for NYI services have been developed at national level and were widely available in the regions and facilities included in this assessment. Among the 10 job aids for safer provision of care that were assessed, an average of 74% were available across facilities. Among the 19 guidelines for safe infant care practices that were assessed, an average of 60% were available across facilities. Region 2 facilities had a higher percentage of the guidelines and job aids available (**Table 2**). Specific interventions that were not addressed in protocols/guidelines were: thermal protection, maintaining a low stimulation environment, Zika, and alternative feeding practices for infants who cannot breastfeed

**Building and unit infrastructure for NYI services:** National and regional level informants acknowledged that most facilities had been constructed without consideration of the needs for neonatal care services and the MOH is now being urged to plan for these services in all new hospital constructions. During interviews, providers (n=17) and mothers of current inpatient infants (n=19) also consistently mentioned congestion in the units as a problem.

**Availability of skilled service providers:** The lack of neonatologist in the regions and districts and an inadequate number of pediatricians and specialist NMW for neonatal care were identified as key problems for expanding and developing neonatal care for sick infants. Training in neonatology for doctors and nurses is not currently offered in Ghana, however curriculum development for preservice training of medical and nursing professionals in these specialties is in process. National, regional, and facility level respondents all identified staff motivation and incentives as important to improve staffing in rural facilities providing NYI care.

**Table 2: Availability of policy, planning, and service provision documents (strategies, protocols, guidelines)**

Category of information	Percent of all content for the category that is addressed in any national documents
Planning for NYI services <sup>1</sup> (9 items)	64%
Prenatal care intervention <sup>2</sup> (4 items)	100%
Essential newborn care <sup>3</sup> (6 items)	100%
Newborn assessment <sup>4</sup> (6 items)	83%
Identifying at-risk newborns and actions to be taken <sup>5</sup> (7 items)	86%

<sup>1</sup> National strategic plan for newborn and NYI services, plans for expansion that include inpatient care, staffing and capacity, pre-service and in-service training curricula, standards for services and quality improvement strategies.

<sup>2</sup> Antenatal corticosteroids for premature labour, magnesium sulfate for pre-eclampsia and fetal neuro protection, and antibiotics for premature rupture of membranes.

<sup>3</sup> Exclusive breast feeding, thermal protection (delay bath, skin to skin), infection prevention (cord care, hand washing) and delayed cord clamping.

<sup>4</sup> Assessment and screening components, including birthweight, measuring head circumference, gestational age, and congenital anomalies.

<sup>5</sup> Identifying low birth-weight (LBW), prematurity, birth asphyxia/respiratory problems, management of hypothyroid, zika, Rh incompatibility, and monitoring for preterm/LBW infants

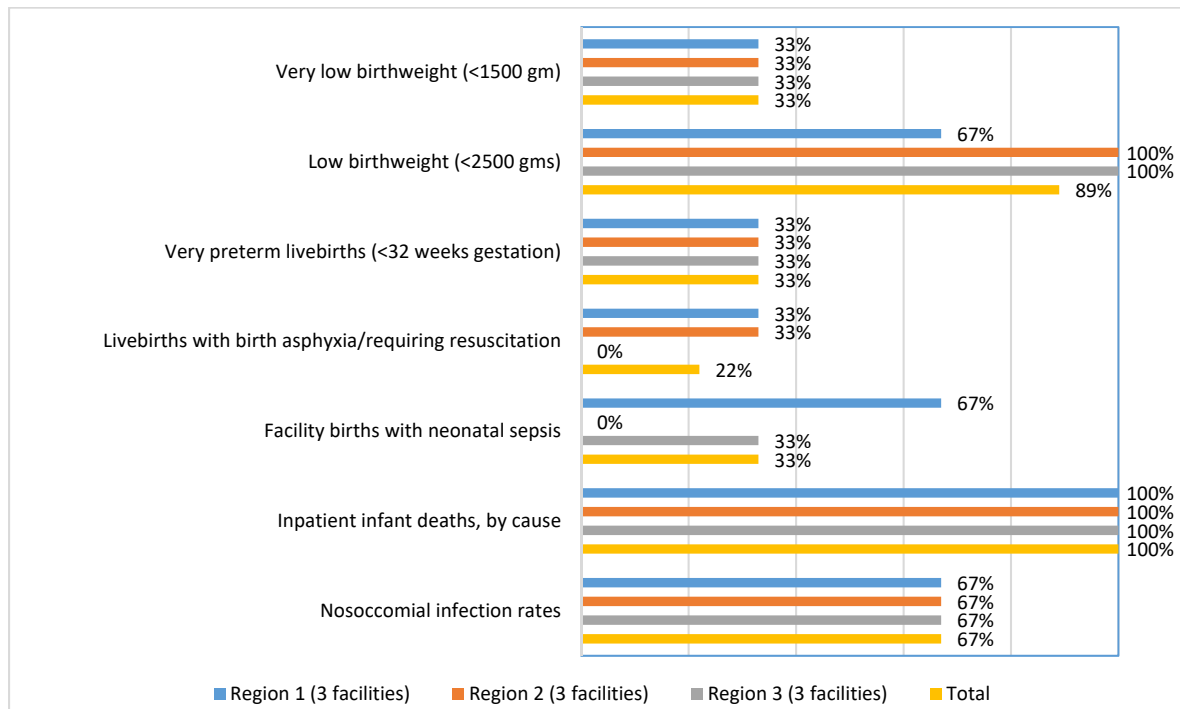
Identifying beneficial practices to be implemented <sup>6</sup> (7 items)	71%
Routine monitoring of NYI inpatient <sup>7</sup> (7 items)	100%
NYI conditions/interventions <sup>8</sup> (22 items)	95%

## B. Systems and practices for improving quality of care

**Reporting and monitoring indicators:** All facilities submit routine reports on services. Monitoring indicators for infant outcome and newborn risk signs (e.g., low birthweight) is reported at all levels with evidence that this is systematic (**Figure 1**).

**Supervision:** Both regions reported they supervise NYI care using the national integrated monitoring tool. Supervision at facility level by personnel from outside the facility, where checklists are used was widely reported by facility key informants. Among the 75% of NMW staff who reported recent (in the past 12 months) supervision, 3 in 4 identified this as internal supervision, and 1 in 4 as external supervision. Physician respondents reported less experience with recent supervision (25%).

**Figure 1: Percentage of facilities reporting indicator monitored at facility level (n=9 facilities)**



**In-service training:** In-service training was defined as formal training provided in planned sessions. This is usually group training either in the facility or another centralized training site. Informal on-the-job

<sup>6</sup> Promoting human milk feeding, general NYI feeding, rooming-in, parental access, low stimulation (light/noise) in the care unit, thermal protection, and infection prevention.

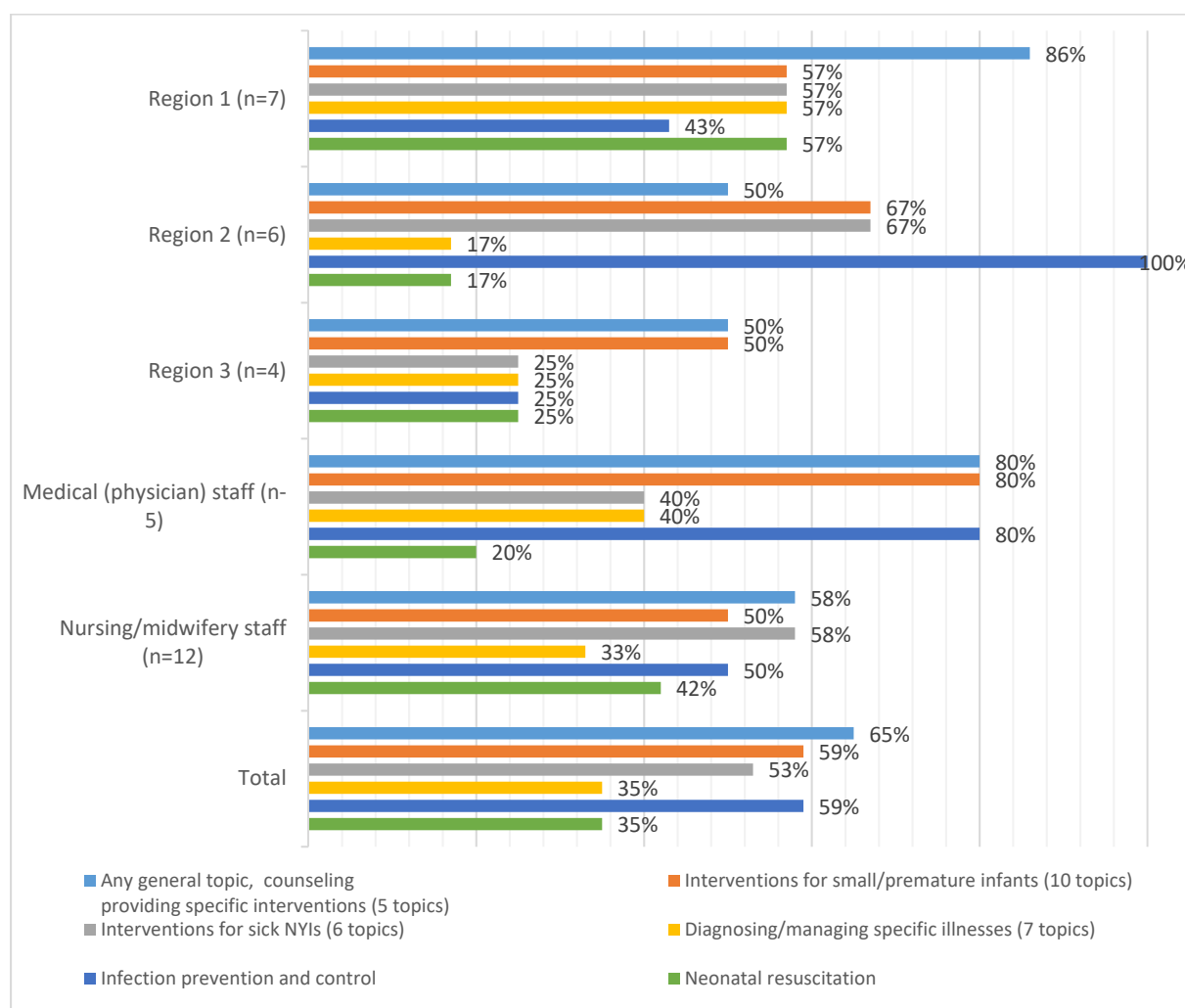
<sup>7</sup> Guidelines for monitoring include the number of times per day temperature, respiratory rate, weight, color, feeding status, urine/stool status, and infant level of activity should be assessed.

<sup>8</sup> Safe oxygen for term and preterm, CPAP, Surfactant, blood transfusion, intravenous fluid, KMC, pain management, alternative feeding, failure to thrive, thermal care, hypoglycemia, dehydration, severe infection, meningitis, tetanus, seizures, breathing disorders, hyperbilirubinemia, HIV exposed, hepatitis.

training was not considered. The topic assessed may have been covered in a particular training or may have been part of a training that covered multiple topics.

Specific topics for in-service training were grouped under the broad categories of general infant care (5 topics), interventions for small/premature infants (10 topics), interventions for sick NYIs (6 topics), and diagnosing and managing specific illnesses (7 topics) (**Figure 2**). Specific topics included in these categories in which interviewed staff reported receiving training in the past 12 months were neonatal resuscitation (20% of interviewed physicians and 42% of interviewed NMWs), with all reporting the training included practice on a doll, hypothermia (20% of physicians and 25% of NMWs); and skin-to-skin positions/kangaroo mother care (KMC) (60% of physicians and 42% of NMWs). The interviewed staff identified a need for improving their skills, providing suggestions for the topics they think are most important and asking for cross-facility training.

**Figure 2: Percentage of medical and nursing/midwifery respondents reporting they received in-service training in the past 12 months on at least one topic within the indicated subject**



**Quality assurance/improvement:** Quality assurance and quality improvement practices are reported frequently at the facility level, with examples provided by 63% of facilities of their responding to findings (**Table 3**).

**Accreditation and Certification:** All facilities reported that they participate in accreditation or certification programs. One facility reported specifically that they participated in accreditation for training of specialist

physicians by the West African College of Physicians and Surgeons (WACPS). All facilities reported they are currently accredited or certified by the National Health Insurance Scheme (NHIS) and 67% by Health Facilities Regulatory Agency (HeFRA).

**Table 3: Activities for monitoring and addressing quality of care**

Background characteristic	Percentage of facilities reporting the indicated activities for monitoring quality of care					Number of facilities
	Facility monitors indicators of service quality	Nosocomial infection rates are monitored	Quality assurance/ Quality improvement activities	Accreditation/ certification program	Baby friendly designated facility <sup>9</sup>	
	(a)	(b)	(c)	(d)	(e)	
Region 1	100%	67%	67%	100%	67%	3
Region 2	100%	67%	100%	100%	100%	3
Region 3	100%	67%	100%	100%	67%	3
Regional Referral Hospital	100%	100%	75%	100%	75%	4
District Hospital	100%	40%	100%	100%	80%	5
<b>Total (percent distribution)</b>	<b>100%</b>	<b>67%</b>	<b>89%</b>	<b>100%</b>	<b>78%</b>	<b>9</b>

**Case reviews:** All facilities report conducting perinatal or neonatal death audits, with 78% reporting they use a structure form to guide the audit and most (78%) able to provide examples of changes resulting from these audits. Case reviews for NYIs receiving care are also widespread (**Table 4**).

<sup>9</sup> <https://www.unicef.org/programme/breastfeeding/baby.htm>

**Table 4: Infant case reviews**

Background characteristic	Among facilities conducting any routine death reviews percentage where the following apply				Example provided of action resulting from death review	Other reviews performed		Number of facilities conducting any perinatal/ neonatal death reviews
	Structured form for death reviews <sup>1</sup>	Perinatal death Audits <sup>2</sup>	Perinatal death audits, audits include stillbirths	Neonatal death reviews		Patient case reviews <sup>5</sup>	Near misses <sup>6</sup>	
	(a)	(b)	(c)	(d)		(e)	(f)	
Region 1	67%	67%	67%	100%	100%	100%	67%	3
Region 2	100%	100%	100%	100%	67%	100%	100%	3
Region 3	67%	67%	50%	100%	67%	67%	67%	3
Regional Referral Hospital	100%	100%	75%	100%	100%	100%	100%	4
District Hospital	60%	60%	60%	100%	60%	80%	60%	5
<b>Total (percent)</b>	<b>78%</b>	<b>78%</b>	<b>67%</b>	<b>100%</b>	<b>78%</b>	<b>89%</b>	<b>78%</b>	<b>9</b>

<sup>1</sup> This refers to a preprinted form that outlines the information that is to be included in each death review.

<sup>2</sup> Perinatal death includes stillbirths to 7-day old infants.

<sup>3</sup> Neonatal deaths are deaths in livebirths who died at 0-28 days of age

<sup>4</sup> Facility was able to provide an example of a change that resulted from QA/QI activities review.

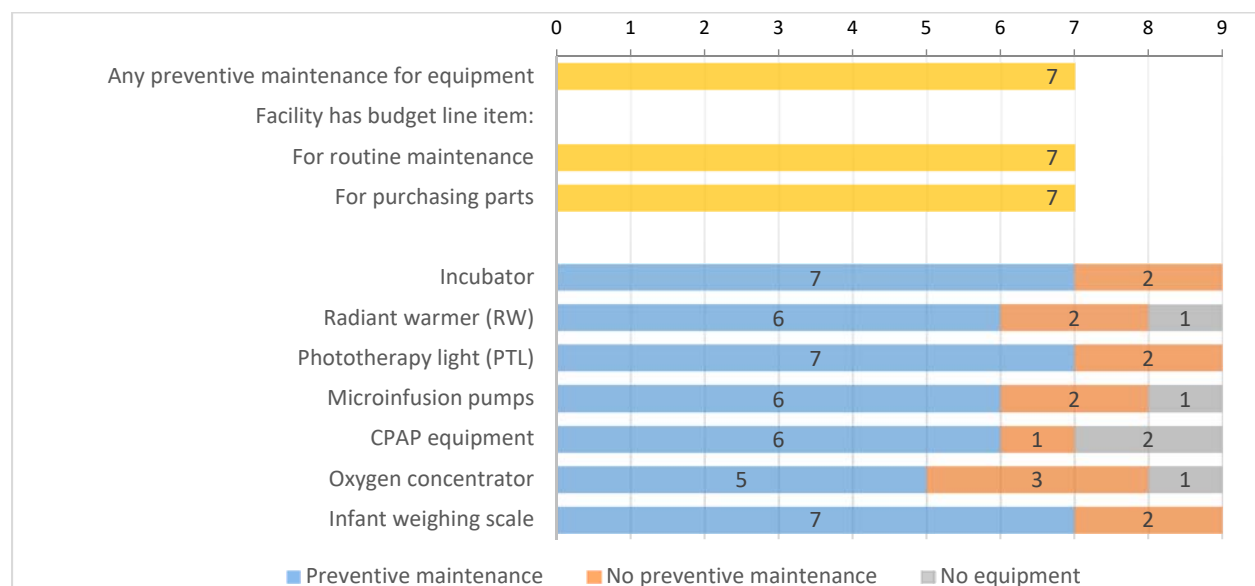
<sup>5</sup> A case review is a formal meeting where information about a current or discharged patient is presented, usually by the primary physician for that patient, and issues related to diagnosing, treating, and improving the outcome are discussed. Suggestions from peers are sought.

<sup>6</sup> Near-misses are newborns that almost died at birth.

## C. Systems and practices to support services availability

**Equipment procurement and maintenance:** National policies and guidelines for procurement of equipment have been developed and trained staff to provide maintenance and repair services are reported available at regional, and in some cases, district levels. Maintenance plans for equipment are reported by national level to be included in the purchase of equipment, however facilities are expected to ensure these activities are conducted, including paying for repairs, despite having no routine budgets for these activities. Essentially all facilities were found to have non-functional equipment that was important for NYI services, including incubators, and almost all interviewed providers described this as a problem during the past 3 months. **Figure 3** provides information on reported preventive maintenance practices.

**Figure 3: Number of facilities reporting preventive maintenance for indicated equipment (n=9 facilities)**



**Drug procurement:** National policies and guidelines have been developed for procurement of drugs. Although no national level gaps in availability of NYI drugs were reported, regions did report filling gaps the past 3 months by regional procurement, and facilities reported shortages of emergency drugs as well as requiring parents to purchase drugs needed by their infant from outside the facility.

**Oxygen:** There is a national oxygen policy and no national shortage of oxygen was reported from any level for the prior 6 months.

**Emergency transportation:** A national plan for emergency transportation with the fleet managed at regional and district levels exists, however, covering the costs for repair and fuel was identified as a problem that has affected the ability to refer infants when needed. The need for transportation incubators was identified.

### III. FACILITY-LEVEL FINDINGS

#### A. Infant care units

**Infrastructure for the infant care units:** Infrastructure was not strong, with a regular supply of electricity (including back-up electricity sources filling gaps) lacking in 33% of facilities. One facility also did not have a functional toilet for parents/caregivers. All facilities had water from an improved water source. All but one facility had capacity for processing equipment for reuse by high-level-disinfecting (HLD), which is sufficient for most equipment. The actual process reported, however, was not always sufficient, with 1/3 reporting only washing or only HLD processing plastic equipment (Table 5).

**Table 5: Types of infant care units in assessed facilities**

Background characteristic	Percentage of facilities with the indicated type of infant care unit							Number facilities
	NICU	Special care <sup>1</sup>	Basic care unit <sup>2</sup>	KMC Unit	Well newborn nursery	Well-baby rooming in <sup>3</sup>	Mixed levels <sup>9</sup>	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	
								(h)



Region 1	67%	33%	67%	67%	0%	33%	100%	3
Region 2	67%	100%	100%	67%	33%	0%	33%	3
Region 3	67%	67%	67%	0%	0%	0%	0%	3
Regional Referral Hospital	100%	75%	100%	75%	25%	25%	50%	4
District Hospital	40%	60%	60%	20%	0%	0%	40%	5
<b>Total (percent)</b>	<b>67%</b>	<b>67%</b>	<b>78%</b>	<b>44%</b>	<b>11%</b>	<b>11%</b>	<b>44%</b>	<b>9</b>
<sup>1</sup> Providing treatments for illness or at-risk NYIs but not considered NICU (as defined by facility) <sup>2</sup> Pre-discharge unit for sick newborns (this may include patients receiving Kangaroo Mother Care (KMC)) <sup>3</sup> Rooming in (baby stays with mother) for newborns not requiring treatments. <sup>4</sup> The result for mixed units should be taken with caution as only one facility reported a mixed unit caring for sick infants and no other units. Two facilities in Region 2 reported specific units for sick infant as well as mixed units								

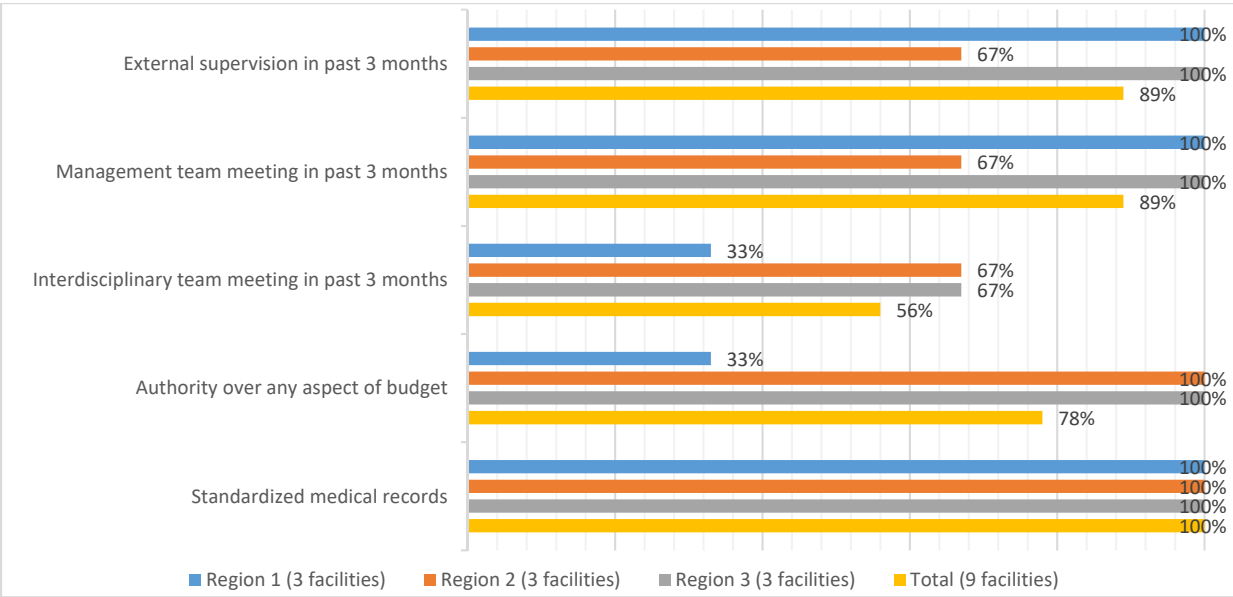
**B. Staffing qualification and numbers**

Lack of specialized neonatal care staff were found, with no assessed facilities having neonatologists or retinal surgeons. Four of 9 (44%) facilities had a pediatrician (all but one were located in Region 1), and there were 2 pediatric nursing specialists in each of Region 1 and Region 2.

**C. Facility level management practices**

Evidence of facility level routine management meetings, interdisciplinary committee meetings, authority over any aspect over management of funds, and use of standardized medical records were assessed as practices to support routine availability of quality services. While the practices were widely reported, there were weaknesses that varied by region (Figure 4).

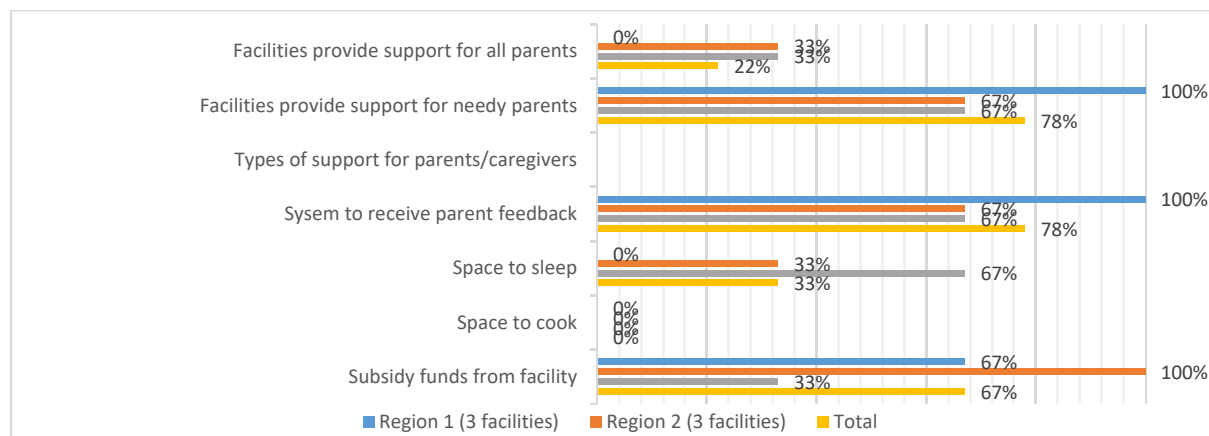
**Figure 4: Percentage of facilities reporting the indicated management practices (n=9 facilities)**



## D. Support for parent/caregiver

Responses from all facilities indicated an awareness of the need for facility support to caregivers in staying with the infant. All facilities reported they provide some support to parents/caregivers with 22% reporting the support is for all parents, and 78% that the support is selective for those with financial need (**Figure 5**). Feedback systems from caregivers of inpatient infants were reported by 78% of the assessed facilities. Despite recommending improvements in amenities, the overall opinion of the interviewed mothers (n=19) about the conditions at the facility were good.

**Figure 5: Percentage of facilities reporting the indicated support for parents/caregivers of infants (n=9 facilities)**



## E. Staff management practices

Staff availability in infant care units, general staff management practices, and practices to fill temporary shortages when existing staff are absent, were assessed. Sixty-seven percent of facilities report that they routinely rotate the nursing staff between units every 6-12 months. Practices to fill staffing shortages included pulling staff from other units and calling off duty staff in to work. Almost all units reported when they bring staff from other units or when they have new staff, these staff are assigned to less sick patients in order to maintain quality of care. Staff attitudes toward practices used to fill staffing gaps and rotating staff between units were mostly positive. Shortages in availability of assigned physicians were mostly filled by physicians working longer hours, strictly enforcing shift assignments, and telemedical consultation.

## F. Patient transfers

**Out referrals:** Referrals out were performed by all but one of the assessed facilities, with all but 1 of these reporting they have an ambulance. None of the facilities had a functional infant incubator for transportation and only two reported they employ skin-to-skin methods to prevent hypothermia during transportation.

**Intake (in referrals):** Referrals in are accepted by all facilities. Initial assessments of the sick infant were reported to take place in a 24-hour intake unit with a physician onsite (e.g., emergency room) for all but one facility. One facility reported that sick infants are immediately sent to the infant care unit. Initial treatment in the intake unit was reported in only 22% (n=2) of the 9 facilities with the others reporting that initial treatments are mostly conducted in the infant care units. Triage practices and functional resuscitation equipment were universally available in the intake unit.

**Internal transfer practices:** All facilities reported that, when transferring a patient internally information is sent with the patient record accompanying the patient. In addition, 67% reported that a NMW also accompanies the patient. One facility reported that skin-to-skin position is used always during internal

transfer, and an additional 5 facilities (56%) reported this practice at least half the time. Two facilities reported inter-unit meetings are held to coordinate patient care between units.

## **G. Care coordination and communication**

**Discharge planning and provider and caregiver experiences:** Most facilities (78%) reported formal discharge planning, with 78% reporting specific strategies to improve adherence to treatments as well as follow-up appointments after discharge. With the exception of Region 1, there was very little formal linkage with community workers and only 1 facility had a list of community resources. Inclusion of community representatives and liaising with community groups (e.g. mother-to-mother support groups) who might provide some additional support for the parents/caregivers was not commonly reported. Linking up with the Community Health Planning and Services (CHPS) system where community health officers based in the communities conduct regular home visits and support mothers and newborns. This is being used in the Eastern region to follow up mothers practicing KMC.

Although 94% of the interviewed providers reported that when conducting discharge planning they consider the capacity of the parent/caregiver to care for the infant after discharge, only 33% of the facilities had any written guidelines for assessing the caregiver capacity. Just over half (55%) of the facilities had written discharge criteria. Providers acknowledged cases where they felt the mother could not care for the infant at home and were able to provide examples of managing this through involving other family members or the DSW or a chaplain.

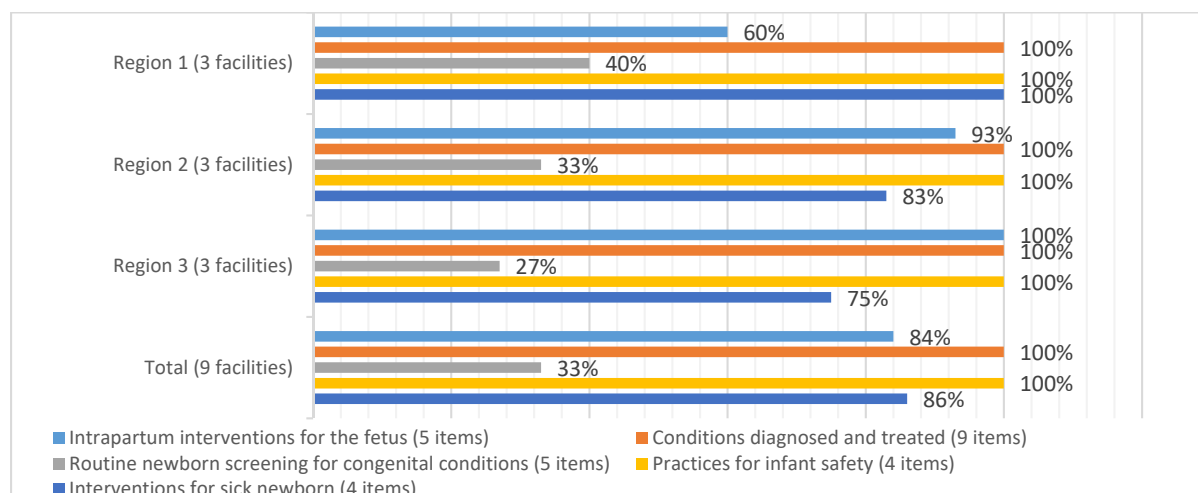
Among the 19 interviewed mothers of current inpatient infants, 63% reported providers had discussed issues related to discharge and 89% reported they felt comfortable about caring for the infant at home. When asked about resources available to support their caring for the infant at home, the only resources mentioned were neighbors/relatives (26%), home visits from health workers (21%), they could receive a follow-up phone call (11%), and they could seek help from a facility closer to home (68%). Upon prompting, danger signs to watch for in the infant on discharge and for which help should be sought were identified by half or fewer of the 63% of mothers who reported they were counseled on danger signs. Fever was the most commonly identified danger sign.

## **IV. SERVICES AND RESOURCES FOR NEWBORNS AND YOUNG INFANTS**

### **A. Availability of inpatient services for NYIs**

Services considered critical for quality care for the sick infant were assessed for availability in the facility. With the exception of one facility that does not provide delivery services and where the highest infant care unit is considered a basic care unit, all facilities provided diagnosis and treatment for the 9 assessed illnesses which are common reasons for infant hospitalization (**Figure 6**). All facilities reported adhering to basic interventions/practices for infant safety, however in actual practice, sharing of infant cots and inconsistent thermal care practices (particularly during transfers) were found. An average of 95% of the 5 assessed intrapartum services and 38% of the 5 assessed congenital disorders were available across the 8 facilities that provide delivery services.

**Figure 6: Average percent of all services within each category that are reported available in the facilities assessed in each region**



## B. Specific infant care services and resources for their provision

Specific services were assessed in the unit where they were most often provided, most often the highest-level infant care unit.

- Among the 78% of facilities reporting they provide KMC, resources for skin-to-skin practices were widespread, however, privacy for the mother and child, and guidelines were lacking, and less than 50% of the units reported they had specific KMC units.
- All units reported they promote breastfeeding.
- Among the 78% of facilities reporting they provide alternative feeding, most had resources for tube or cup feeding, however, resources to promote use of expressed or banked breastmilk were lacking.
- All facilities reported providing services for severe bacterial infection, such as suspect meningitis or sepsis and this was the most common diagnosis among current inpatient infants. Two (22%) facilities reported that identified cases are provided an initial dose of antibiotic and then referred to another facility, and 88% reported they provide the full treatment in the facility. Among facilities reporting they provide the full treatment, one facility also reported they sometimes provide the initial antibiotic treatment and then refer. All of the facilities reported using clinical symptoms to diagnose sepsis with laboratory test for differential diagnoses having limited availability. Cerebral spinal fluid (CSF) testing was available in 67% of facilities, cryptococcal tests in 11%, and culture and sensitivity for other specimens (in 67% with the facilities without NICUs having the least access to these tests. At least two antibiotics for treating sepsis were observed in all facilities.
- All facilities reported providing services for infants with respiratory distress, with basic resources available in all but one facility. Advanced respiratory treatments such as continuous positive airway pressure (CPAP) and artificial ventilation were not widely available. Even where diagnostics such as pulse oximeter and x-ray were available, they were not reported to be routinely used for diagnosis and monitoring.
- Although all facilities reported providing services for infants with seizures, diagnostics for determining the underlying cause (the same as tests used for sepsis) were not widely available. Although all facilities reported they had an electro encephalograph machine (EEG) none reported using this for infant diagnosis.

- All facilities reported diagnosing and treating hyperbilirubinemia/jaundice, and 67% had a phototherapy machine. Access to laboratory tests for monitoring bilirubin level and exchange transfusion services, however, were limited. Interviewed staff identified this as a priority service for improving resources and skills.

### C. Protocols, guidelines, job aids at NYI care points

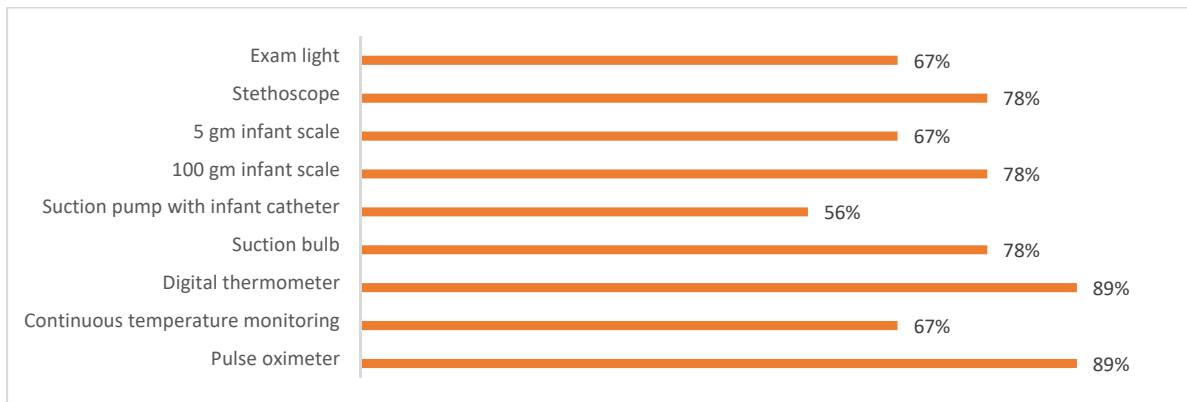
Job aids to minimize mistakes in infant treatment, such as guides for calculating intravenous fluid dose and drug dosages (both available in 78% of facilities) were also widely available, although only 2 facilities had all 7 assessed job aids.

## V. AVAILABILITY OF EQUIPMENT, DIAGNOSTICS, AND CONSUMABLE RESOURCES

### A. Monitoring, diagnostic, and treatment equipment

**Basic equipment:** On average, each assessed of equipment was not available in 25% of facilities, with a suction pump and catheter the most often not available (**Figure 7**).

**Figure 7: Percentage of facilities with each basic equipment item (n=9 facilities)**

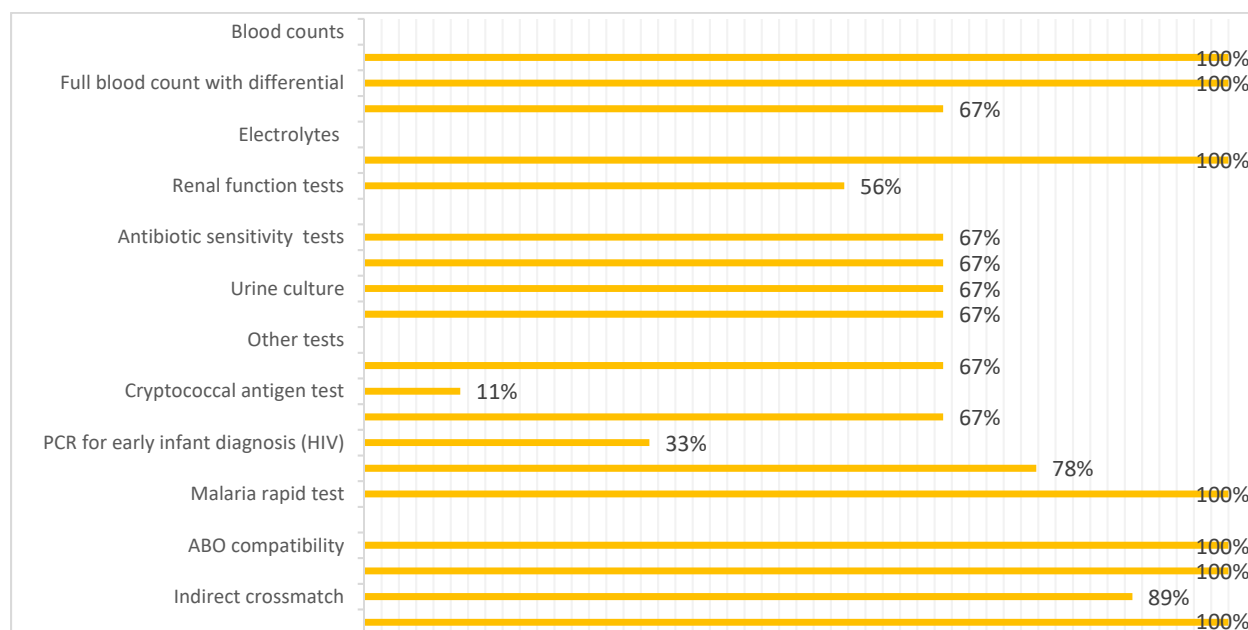


**Bag and mask for resuscitation:** One facility was lacking a bag and mask for preterm infants, and one a neonatal bag and mask. Thirty-seven percent of facilities that had bags and masks reported a gap in availability of functional and 50% a gap in availability of functional neonatal bag and mask in the past 3 months.

**Radiographic and laboratory diagnostic equipment:** Most basic radiologic diagnostics were available, with availability higher in facilities with NICUs. All facilities had a functional x-ray, ultrasound, and EEG machine.

On average, each facility had 76% of the 19 assessed tests (**Figure 8**). All tests were not available in any facility although, as expected, tests were more available in facilities with NICU services. Capacity to test blood for genetic disorders was not available in any facility, and tests for cryptococcal infections and blood gasses were each found in only 1 facility. There were no major regional differences in overall availability of the laboratory diagnostic tests in the facilities assessed.

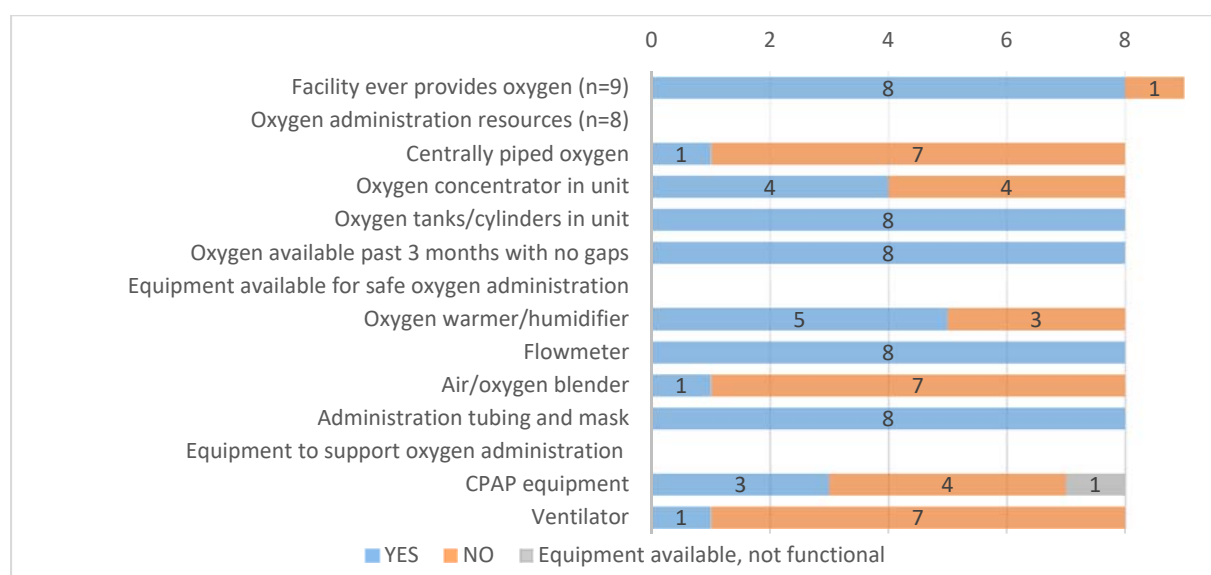
**Figure 8: Percentage of facilities with capacity to perform each test (n=9 facilities)**



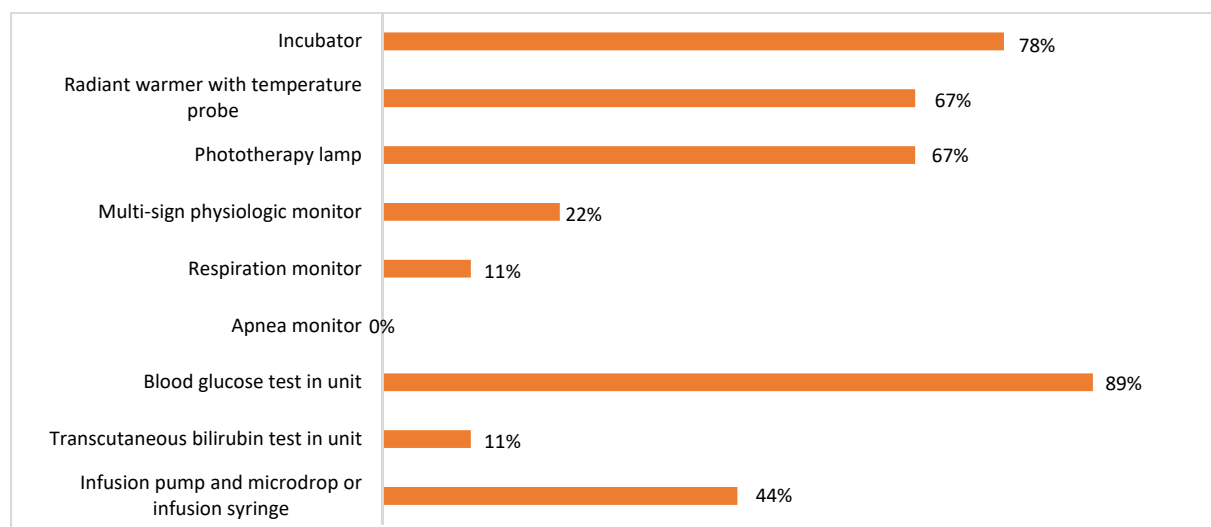
**Oxygen:** All but one facility provided oxygen, with those offering oxygen reporting no gaps in supply the past 3 months. Critical equipment for administering oxygen (flowmeter and tubing) were universally available, however, humidifiers and air/oxygen mixers, ventilators, and CPAP equipment were less available (**Figure 9**).

**Advanced equipment for infant care and monitoring:** The highest-level infant unit was assessed for availability of infant care equipment (**Figure 10**). Incubators and phototherapy lamps are available in all but the lowest level facility. Physiologic monitors for continuous monitoring of vital signs, and micro-infusion pumps to minimize the risk of intravenous infusion errors were least available.

**Figure 9: Number of facilities with oxygen administration resources (n=8 facilities)**

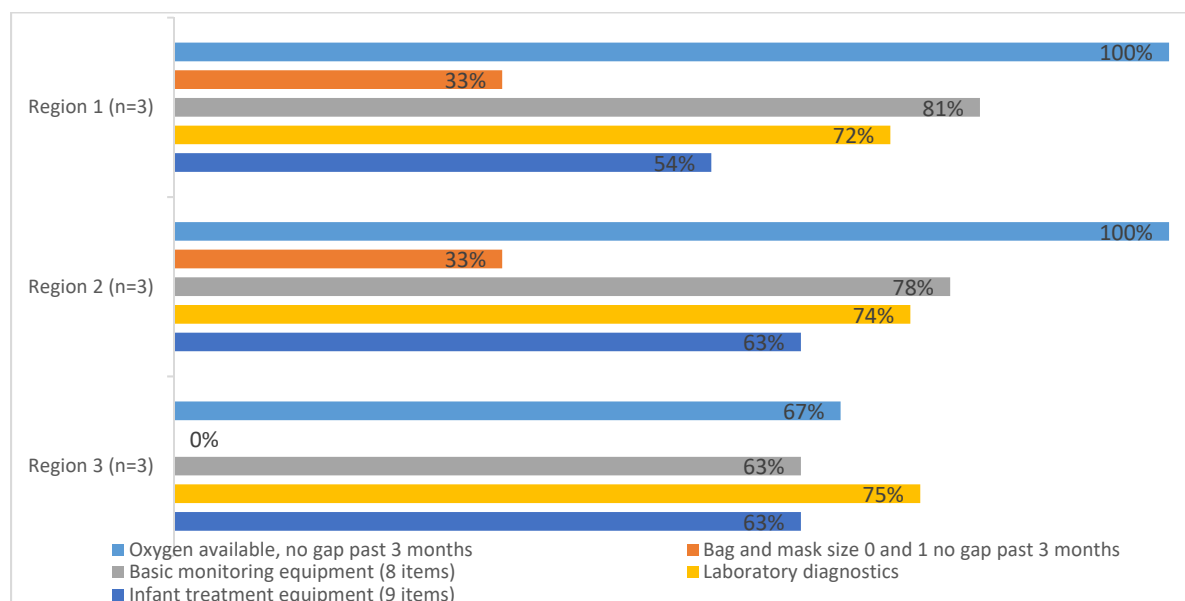


**Figure 10: Percentage of facilities with the indicated infant care equipment (n=9 facilities)**



When reviewing the overall availability of the monitoring and treatment resources by region (**Figure 11**) it is noted that among their 3 assessed facilities, Region 3 facilities has the lowest average percentage of all items within each category.

**Figure 11: Average facility percentage of items available for facilities in each region (n is # of facilities in the region)**



## VI. PHYSICAL ENVIRONMENT OF INFANT CARE UNIT

### A. Infection prevention and control (IPC) in the highest level NYI service area

Infection prevention items were widely available in the infant care units, with an appropriate container for infectious waste the most commonly lacking item (33%). Hand hygiene items were available beside all infant cots in 78% of facilities, however, infants were sharing incubators and cots and around half of the units had infant cots that were arranged too close for effective prevention of transmission of infection.

Congestion in the units was mentioned by interviewed providers and caregivers as a problem for providing quality services. Disposal of infant diapers/feces was in an appropriate container (plastic liner with lid operated by foot pedal) in 56% of facilities and all facilities reported that cot and incubators are wiped with disinfectant for cleaning and infant blankets and bedding are washed between infants.

## B. Observed infant safety practices

Data collectors were asked to observe providers in the highest-level unit for 5 minutes to assess practices related to reducing stimulation of the infants and IPC. On average, providers were observed moving between infants without washing hands in 33% of units, 75% of the units were not quiet, 67% did not have low light, and 87% did not have signage to keep the noise level low. None of the units had thermometers for objectively identifying room temperature.

## VII. REVIEW OF INFANT MEDICAL RECORDS

### A. Recording of newborn assessment

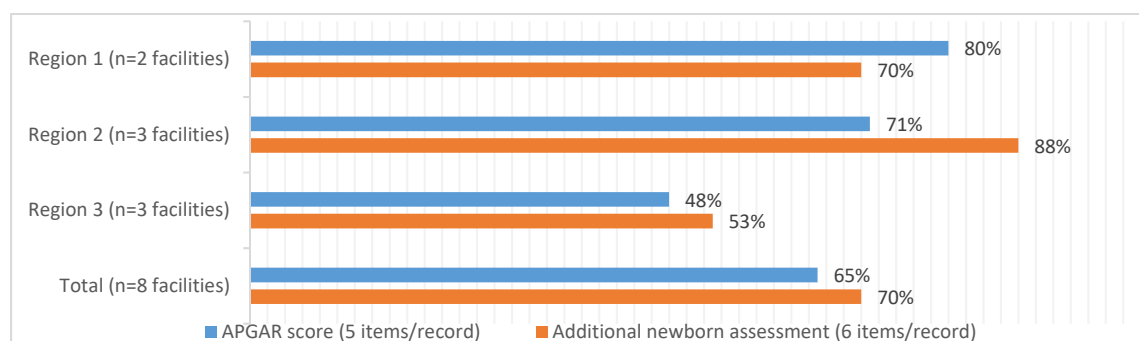
One facility (Region 1) did not offer delivery services so was not eligible for review of recording of information on newborn assessment. Record reviews used the facility as the unit of analysis, to represent facility practices.

Records of sick infants who were born in the facility were assessed for documentation at birth of the 5 items that are used to determine the Apgar score. Assigning an Apgar score at birth was observed, but the findings for each of the 5 components for Apgar were not consistently recorded. On average, the percentage of records in each facility with the indicated item for the Apgar score were heart rate (83%), infant color (65%), breathing status (60%), muscle tone and responsiveness (58% each).

Additional physical findings at birth are not consistently recorded except for birthweight and gestational age. On average, the percentage of records in each facility with the indicated item for additional newborn assessments were birth weight and gestational age was (93% each), any note on danger signs (65%), respiratory rate (63%), temperature (60%), with the least documented item being congenital abnormalities (50%).

On average 65% of the items for APGAR score were recorded on records in each facility and 70% of the additional newborn assessment items. Overall, documentation of these essential newborn assessment items was weakest in Region 3 (**Figure 12**).

**Figure 12: Average facility percentage of items documented for each type of assessment in the reviewed records, by regions**



### B. Recording for the sick infant

**Admission history and physical:** On average, the percentage of records in each facility with the indicated item for admission history documented were transfer/referral notes for 78% of records, patient

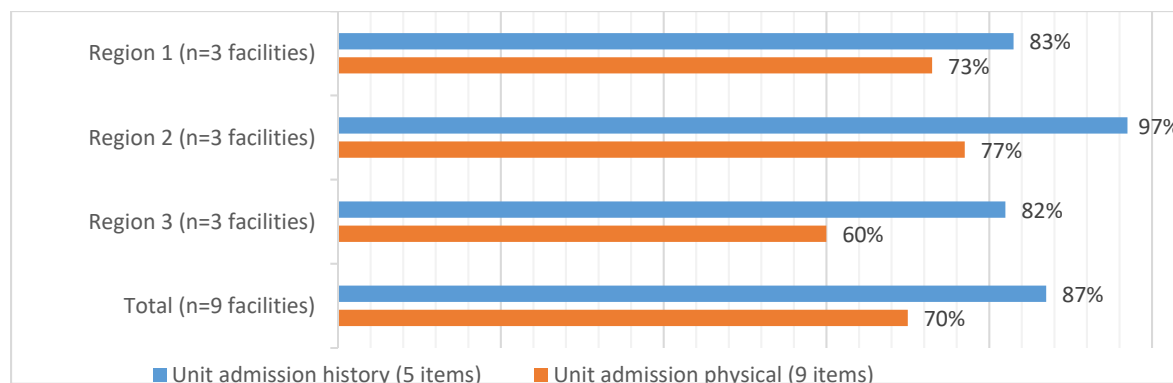


history (98%), admission diagnosis (97%), admission symptoms (88%), maternal pregnancy history (88%), and mode of delivery (74%).

On average, the percentage of records in each facility with the indicated item for admission physical documented were infant age (93%), temperature (95%), heart rate (79%), respiratory rate (78%), breathing status (77%), notes on danger signs (73%), color and responsiveness (54% each), and muscle tone (27%).

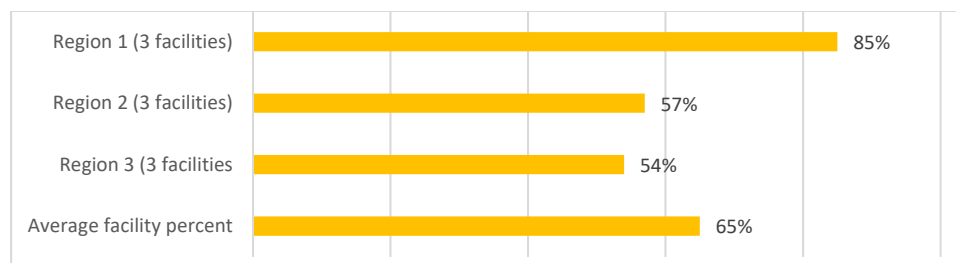
Documentation of the admission history and physical for sick infants was similar, with an average of 87% of items for an admission history and 70% of items for admission physical documented. Region 3 had the weakest documentation for the admission history and physical for sick infants (**Figure 13**).

**Figure 13: Facility average percentage of all items for each type of assessment that is documented in the reviewed records**



**Recording for infant care and monitoring information:** Only 67% of the facilities (6 of 9) had written guidelines for what was expected to be recorded for routine infant monitoring. On average, the percentage of records in each facility with the indicated item for routine infant monitoring were medicine orders, medicines administered, and a daily progress note (100% for all), documenting temperature at least 3 times/day (98%), respiratory rate 3 times/day (76%), daily weight (62%) with an infant growth chart (16%), information noted about feeding (44%), urination (31%), and stool (27%) (**Figure 14**). Region 1 had the highest average percentage of the 10 assessed items recorded (85%), Region 2 the second highest (59%) and Region 3 the lowest (54%).

**Figure 14: Average facility percent of 10 routine monitoring items that are recorded**



**Recording of discharge planning:** Very little was documented to indicate assessments in preparation for discharge, with notes only observed in Region 1 facilities.

## VIII. PERSONAL EXPERIENCES AND OPINIONS

### A. Service providers and managers

Issues related to improving quality of care for sick NYI that were most frequently identified by interviewed providers aligned with the issues identified during the facility assessment of service conditions. Lack of space for infant care units, lack of functional and sufficient amounts of equipment (54%), drug shortages (47%), and lack of skills to manage complex infants (68%) were mentioned.

**Provider and parent/caregiver interactions:** Providers also identified emotional stress in coping with very sick infants and parents/caregivers as issues they have experienced (68%).

### B. Mothers of current inpatient infants

Mothers were mostly aware of the problem that necessitated their infant being in the facility. Providers and parents/caregivers identified lack of support for the costs of medicines as a major problem with 74% of the interviewed parents reporting they did pay for medicines, and 21% identifying this as a large cost for them. The interviewed parents/caregivers all felt that their infant was treated well and 95% felt they were treated well, although they did mention that communication could be improved.

## IX. DISCUSSION AND CONCLUSIONS

**Strategic planning for expanding NYI care units:** There is a strategic plan for expanding NYI services and basic NYI policies and guidelines are in place and being implemented at all levels. Actions, attributed to the increased awareness raised over the course of planning and implementing this assessment, have been taken to strengthen NICU resources and service conditions, providing an indication of strong support from the government and donors for these services. Specific benchmarks for expansion/improvement of NYI services that include numbers of units, specialist staff, and unit infrastructure/equipment/resource standards as well as strategies for achieving the objectives of the strategic plan were not identified.

The strategic plan needs to address not only expansion of services and resources, but also effective implementation of policies that are meant to maintain continuity of services and resources after initial implementation (e.g., preventive maintenance, drug procurement and ordering, emergency transportation). The assessment and interviews at facility level identified weaknesses in implementation of existing policies, with non-functional equipment for critical NYI interventions, gaps in drug supplies necessitating parents/caregivers buying the drugs from outside the facility, and the need for parents/caregivers to pay for referral transportation identified as problems that impede quality services.

A process for capturing the information on the extent to which existing policies are not being effectively implemented and for eliciting feedback from staff and managers most affected by the weak implementation would provide information needed to develop realistic strategies. External supervisors are a natural source for this information if knowledge and experiences from facility visits are brought into the planning process in a systematic manner.

National, regional, and facility level respondents all identified staff motivation and incentives as important factors for improving availability of NYI care providers and sustainable staffing in rural facilities. Providers identified experiencing stress in caring for critically ill infants (related to lack of skills to care for some cases and dealing with cases with poor outcomes), as well as dealing with the parents/caregivers of sick infants. Few (29%) interviewed staff reported receiving in-service training related to counselling parents/caregivers about critically ill infants or those who have died. This issue should be further assessed and interventions to help providers to more effectively manage stressful situations be implemented if needed, as one means for improving staff satisfaction and retention.

**Support for parents/caregivers:** There is an awareness among staff of the importance of supporting parents/caregivers and of the issues that they face that may affect the quality of patient care and follow-up. Many of the NYIs who receive inpatient care will need additional support for themselves and their parents/caregivers in order to maintain their health and improve their status after discharge. To ensure that the need for support is identified, and solutions found, planning for discharge should be interdisciplinary with identification of needs beginning as soon as the infant is admitted. The lack of formal liaison with community representatives and their resources results in exclusion of valuable assets to support the parent/caregiver.

**Support for quality of services:** When asked about problems in providing quality services respondents focused on availability of essential inputs for quality NYI services. There was less attention, however, to issues related to the actual care process, except for identifying the need for skills development. Supervision should help staff to identify where existing skills, resources and systems are not achieving the desired results, for example, it was noted that even where diagnostic equipment and laboratory tests were available (e.g., EEG, culture and sensitivity tests, ultrasound), their use in diagnosing cases were often not mentioned. Follow up questions clarified that these were used for adults, but not for infants. Supervision by persons who work in the facility (internal supervision) is important, but the supervisor in one facility may have a different understanding or skills than internal supervisors in other facilities. External supervision, usually conducted by persons who work for a managing authority or a technical service sector, helps to ensure that standards are followed across facilities and these supervisors are often in a position to ensure that systemic issues can be brought to the attention of higher-level decision makers.

Weaknesses in practices and recent training required to maintain skills were noted. Thermal protection was not included in many of the policies and guidelines for patient care and practices for thermal protection, particularly when transporting infants, were weak. In addition, recent training in hypothermia in the past year was reported by only 20% of medical and 25% of interviewed NMW staff; and in skin-to-skin positions by 60% of medical and 42% of interviewed NMW staff. Finally, malfunctioning incubators were identified and there were no transport incubators. This is clearly an area where an integrated approach to improve thermal protection practices is warranted. It was encouraging that several interviewed staff did identify the need for more use of KMC within their facility.

Training in neonatal resuscitation in the past year was only reported by 20% of medical and 42% of nursing/midwifery staff. This is not sufficient for maintaining skills.

All levels noted that existing infant care units had insufficient space, and a lack of trained neonatal specialty physicians and NMW staff. Most interviewed staff identified a need for improving their skills, providing suggestions for the topics they think are most important and asking for cross-facility training. The most commonly mentioned skills development requested, however, were related to new/advanced technologies such as exchange transfusion. Limitations in availability of diagnostics for differential diagnoses, and of equipment for advanced treatments were observed, with lack of equipment also mentioned by interviewed staff.

Basic resources for NYI services were available for most units providing services for sick infants, and staff identified the need for advanced treatments. However, higher level diagnostics that would improve differential diagnoses, patient monitoring equipment and infusion equipment that would reduce the risk associated with individuals being required to assess and record results, job aids to decrease errors in calculation/calibration of medicine dosages, intravenous fluids, and other relevant treatments are also needed. Equipment and job aids that aim to reduce personnel errors were not mentioned when asked for specific needs.

**Recording infant care and monitoring information:** Information essential for managing any patient includes a history related to the illness/condition, physical findings on admission, diagnostics, treatments, and results from these, including patient signs and symptoms, as they are provided over the course of

management and treatment. For this information to be available for all relevant service providers, and to allow identification of changes over time, the information needs to be recorded.

Although standardized patient charts were available, consistency and completeness of recording newborn assessments and routine monitoring was not evident, and discharge planning was almost never documented. Even if the infant was not ready for discharge, there should be ongoing assessments of the capacity of the parents/caregivers to provide care after discharge, so that potential problems are identified early and the discharge process and patient care and follow-up after discharge are effectively carried out.

Adequate recording of patient information is a universal concern, with medical and nursing staff (legitimately) known internationally to complain that they have no time and it is better to spend time caring for the patient rather than documenting. The problem with this view is that where patient history and monitoring information is not recorded, systematic sharing of information between providers and identifying changes that occur slowly over time is impeded, resulting more in subjective assessments than assessments and actions informed by evidence. Improvement of recording requires guidelines and supervision for monitoring adherence to the guidelines. Guidelines (and standardized preprinted forms) for documenting information at critical points, including routine monitoring results, would be expected to improve consistency and completeness of information recorded, and would improve the ease with which supervisors could rapidly review whether practices are being followed.

***Provider and parent/caregiver interactions:*** Interactions between providers and parent/caregivers as reported by interviewed providers and mothers seemed respectful, with providers describing situations and providing responses indicating they are well aware of the stress that parent/caregivers of sick infants are under and the needs they might have, and parents/caregivers reporting that, overall, they feel that their infant and themselves had been treated respectfully. Providers and mothers identified the need for parents to pay for drugs and transportation required for the care of their infant as important barriers in ability to provide quality services. Providers identified stress related to difficulties in managing the critically ill infant and the parent/caregiver as an issue affecting infant care.

## **X. RECOMMENDATIONS**

### **A. Planning for expansion/improvement of NYI services**

- 1) Standards for infrastructure, resources, and staffing for NYI service units should be established and a strategy implemented to ensure the standards are being followed. Supervision should specifically identify priority items to be rectified (e.g., providing oxygen for a unit managing NYI respiratory distress that does not provide oxygen) and be focused on continuous mentoring and skills building in the areas with identified practice gaps.
- 2) A plan for improving existing units and resources should be developed, prioritizing according to need, and then advocating with donors to respect the MOH/GHS prioritized facilities/units.
- 3) Acceptable alternatives to standards for qualifications and numbers of staff required for different levels of neonatal care should be built into the strategy so that there is a minimum acceptable standard for providers of infant care services that can be achieved and when gaps are identified can be immediately addressed, until the longer-term preferred standards for neonatal specialists are possible. These alternatives (which were identified as part of strategies used by some facilities for filling gaps) may include a functional system for a neonatologist on-call, telemedical consultation, and short-term in-service courses to provide a formal level qualification for medical and nursing staff providing clinical care for NYI.
- 4) A review of organization of services in existing NYI care units should be conducted using flowcharts and other problem analysis tools to identify if changes in organization of NYI care can be made with existing resources to reduce inefficiencies in process and content of care, address

crowding and minimize risk for infection. Implementation of the possible revisions should be supported by regional level.

## **B. Systems to support quality of NYI care**

- 1) Implementation of the plan for maintenance and repair of equipment requires strengthening. A rapid assessment of reasons for malfunctioning equipment—whether it is a funding issue, lack of availability of a qualified person to perform repairs, or a management issue, needs to be performed by regional level health authorities and then a strategy and actions to improve equipment maintenance and repair developed and implemented.
- 2) Ensuring an adequate supply of NYI drugs at the facility level is essential. Again, the cause of the gaps needs to be assessed and then addressed. Policies to ensure that parents are not required to pay out-of-pocket for drugs for their inpatient infant and a means for implementing these policies are needed. Facility level regular monitoring of drug supplies and resupply systems, and regional mechanisms to rapidly address drug shortages in health facilities are also needed.
- 3) Alternative options for funding ambulance repair and fuel for referrals should be explored. Covering emergency referrals for infants through the National Insurance (building some maintenance costs into the reimbursement) or accessing funds through local government may be such options.
- 4) Ensuring that there are systems to support necessary referrals at all facilities caring for sick infants is essential. MOH/GHS should request regional offices to check all relevant facilities to identify those without access to an ambulance and without a system for referring young infants. Ensuring that a system is in place should be monitored. Protocols for thermal protection during transport should be addressed and monitored for compliance.
- 5) A system to improve external supervision of NYI staff to provide on-the-job training and confirmation of adherence to standards in service provision is needed. Interviewed medical staff identified the need to improve their skills and suggested cross-facility learning as well.
- 6) Training and counselling to address the stress that providers identified as an issue when caring for critical infants and their parent/caregiver is an important strategy for improving staff retention and effectiveness in dealing with parents/caregivers.

## **C. Readiness to provide services**

- 1) Guidelines and practices for thermal protection were consistently found to be lacking—this included maintaining thermal protection during referrals between and within facilities. Interviewed providers are aware of KMC and mentioned the need for further training and establishment of KMC units in their respective health facilities. Policies and practices to reinforce eligibility and practices for skin-to-skin position, particularly when the infant is in transit is needed.
- 2) Basic interventions/practices for infant protection that address infection prevention and reduced stimulation should be strengthened through supervision and reminder posters.
- 3) Availability of tools/job aids for supporting safe and accurate provision of services need to be improved in some facilities, particularly in Region 1.
- 4) A plan for routine retraining on neonatal resuscitation and other essential skills through on-site skills lab should be considered.
- 5) Basic monitoring, diagnostic, and treatment services should be upgraded as needed:
  - a. Improved services related to congenital illnesses are needed. Options for diagnosing visual and hearing defects and for testing the newborn for congenital abnormalities should be explored. These might include sending specimens outside, having a specialist rotate between

- facilities or training existing staff to screen specifically for diagnoses requiring physical examinations, and ensuring that guidelines include assessment of congenital abnormalities as part of the severity assessment during admission and inpatient care.
- b. Improving alternative infant feeding practices to include systems and resources for collecting and storing breast milk (breast pumps, storage containers, refrigerators for storing milk), including milk banking if acceptable culturally, is needed.
  - c. Availability of suction with catheter and a system for ensuring consistent availability of preterm and neonatal resuscitation bags and masks (both important for neonatal resuscitation) should be priorities.
  - d. Availability of higher-level equipment for safe delivery of medicines and treatments with priorities on physiologic monitors and infusion pumps with microdrip or infusion pumps (items that reduce the risk of error due to human factor) should be expanded.
  - e. All facilities caring for critical infants should have the capacity to administer oxygen. Oxygen administration equipment that promote infant safety and improved oxygenation (humidifier, air/oxygen blender, CPAP) should be expanded where qualified staff exist for training to utilize the equipment.
- 6) Availability of diagnostic and monitoring equipment for more specific and advanced treatment of infants with conditions such as seizures, sepsis, and respiratory distress should be expanded, and providers retrained to ensure that these are used for diagnosis and monitoring. Specifically, use of existing x-ray and pulse oximetry for monitoring infants with respiratory distress, and either testing ability or systems to improve ability to receive results for advanced laboratory diagnostics for differential diagnoses for sepsis and seizures (culture and sensitivity, other CSF tests) should be improved. Diagnostics for monitoring bilirubin levels can easily be introduced into units to improve the objective monitoring for treatment needs.
- 7) An assessment of initial treatments of infants arriving from outside and pre-referral treatments is needed to identify if the intake units can be/should be more involved in initial treatment. This will depend on existing staffing and the numbers of sick infants who arrive from outside.

#### **D. Infection prevention and control and infant safety**

- 1) The appropriate process for disinfecting plastic equipment for reuse should be reinforced.
- 2) Sharing of cots and incubators should be strictly prohibited—improving equipment maintenance and repair practices should contribute to this being feasible.
- 3) Job aids that remind staff of safe practices that are expected to be followed (hand hygiene between patients, maintain low stimulation environment) would promote adherence.
- 4) A thermometer in each room is important to provide an objective picture of thermal conditions of NYIs. Even if they cannot control the heat, providers can more objectively identify the need to physically intervene if the room is chilly.

#### **E. Recording of infant care**

- 1) Reinforcement of adherence to expected standards for recording of inpatient infant care is needed. Ensuring that guidelines are available in all units and that routine recording of monitoring information by NMW staff is supervised will improve the availability of this information.
- 2) Improving availability of standardized data collection forms, including simple checklists, will support consistency in recording frequency and content of essential information for evidence-based clinical decisions—including ensuring that negative findings are noted so there is not a question about whether an item was assessed. Preprinted forms can reduce the amount of

writing (and potentially the disincentive to recording) that is actually required. Problems with maintaining a paper supply of forms can be anticipated. A wall poster or desk reference sheet that outlines required information may provide the needed reminder of recording standards if printed forms are not available.

- 3) A systematic process for discharge planning requires written guidelines and other aids so that the effectiveness of the process is not dependent on individuals. In addition, strengthening linkages with community resources and ensuring that parents know how to access these should be formalized.
- 4) Introducing/reinforcing use of checklists where the important pre-discharge referrals and counseling are recorded as they are provided to the parents/caregivers would reinforce the process expected to be followed and improve the consistency that these essential practices are performed and documented.

Strong leadership and commitment from the MOH and GHS to reduce preventable neonatal death and enhanced national efforts to improve quality of care for mothers, newborns, and children in the country as part of the global Quality of Care (QOC) Network initiative spearheaded by WHO create favorable conditions to initiate, spread and scale up sick inpatient newborn care improvement practices countrywide.







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University Research Co., LLC  
5404 Wisconsin Avenue, Suite 800  
Chevy Chase, MD 20815

Tel: (301) 654-8338

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